ABSTRACT

[0079] Method and apparatus for sputter depositing silver selenide and controlling defect formation in and on a sputter deposited silver selenide film are provided. A method of forming deposited silver selenide comprising both alpha and beta phases is further provided. The methods include depositing silver selenide using sputter powers of less than about 200W, using sputter power densities of less than about 1 W/cm^2, using sputter pressures of less than about 40 mTorr and preferably less than about 10 mTorr, using sputter gasses with molecular weight greater than that of neon, using cooling apparatus having a coolant flow rate at least greater than 2.5 gallons per minute and a coolant temperature less than about 25°C, using a magnetron sputtering system having a magnetron placed a sufficient distance from a silver selenide sputter target so as to maintain a sputter target temperature of less than about 350°C and preferably below about 250°C during sputter deposition, and heating the sputter deposition substrate to greater than about 30°C.